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Imagery analysis report

**Analysis of Blast Doors Associated
with Chinese CSS-3 ICBM Rollout Sites (S)**

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ANALYSIS OF BLAST DOORS ASSOCIATED WITH CHINESE CSS-3 ICBM ROLLOUT LAUNCH SITES (S)

1. (TSR) This report is a summary of information on the size, shape, composition, and construction of blast doors at Chinese CSS-3 ICBM rollout launch sites. Blast doors, often designated as clamshell doors because of their convex shape, protect the missile storage cave or earth-covered bunker at the new CSS-3 launch sites from enemy attack. Similarly shaped but smaller doors protect the drive-in entrances to the other caves and bunkers that store missile support equipment, propellants, and command and communications equipment at each site. Each entrance has a pair of blast doors that are hinged at the sides and open outward from the middle (Figure 1).

2. (TSR) Imagery of construction activity at Delingha SSM Launch Site 1 [] in 1978 provided the first identification of the interior framework of a blast door (Figure 2). High resolution imagery acquired during October 1978 provided data for detailed measurements of this framework. The door framework is the main structural element of a blast door. It is dark toned and appears to be entirely composed of steel. Other materials, such as wood, were stacked at the launch site and appeared to be somewhat lighter in tone than the door framework. The framework has a checkerboard appearance and measures [] long by [] in overall width. There are six structural members lengthwise and ten cross members. Each structural member has an approximate thickness of []. Each of the 43-45 spaces (voids) between these structural members is [] wide and [] long (Figure 3). A hinge plate was identified at the top and bottom on one side of each framework.

3. (TSR) The sequence of blast door construction at Delingha SSM Launch Site 1 is shown in Figures 4 through 8. The two steel frameworks for the door were delivered to the launch site by [] and stacked one on top of the other. They were each delivered in one piece, already fully assembled. Between [] the door frameworks had been moved to the front of the cave entrance and were turned over, side-by-side (Figure 4). Between [] the door frameworks were installed on the adit facing (Figure 5). During the same three weeks in November 1978, the concrete launch pad was poured and covered to allow the concrete to harden evenly. Attaching the blast door frameworks and constructing the launch pad apparently require special work crews from outside the site. Buses and a large number of vehicles were in the housing support area in November 1978 during this phase of construction.

4. (TSR) No further construction progress was observed until mid-1979, probably because of severely cold winter weather. December 1978 and January 1980 imagery of the blast door frameworks indicated that a solid plate is incorporated into the design. When the sun was at a very low angle and the back of the blast door was open to view, sunlight did not penetrate the framework. The solid plate, probably also made of steel, appears to form the back surface of the blast doors, i.e., the concave side facing the missile storage area (Figures 2 and 6).

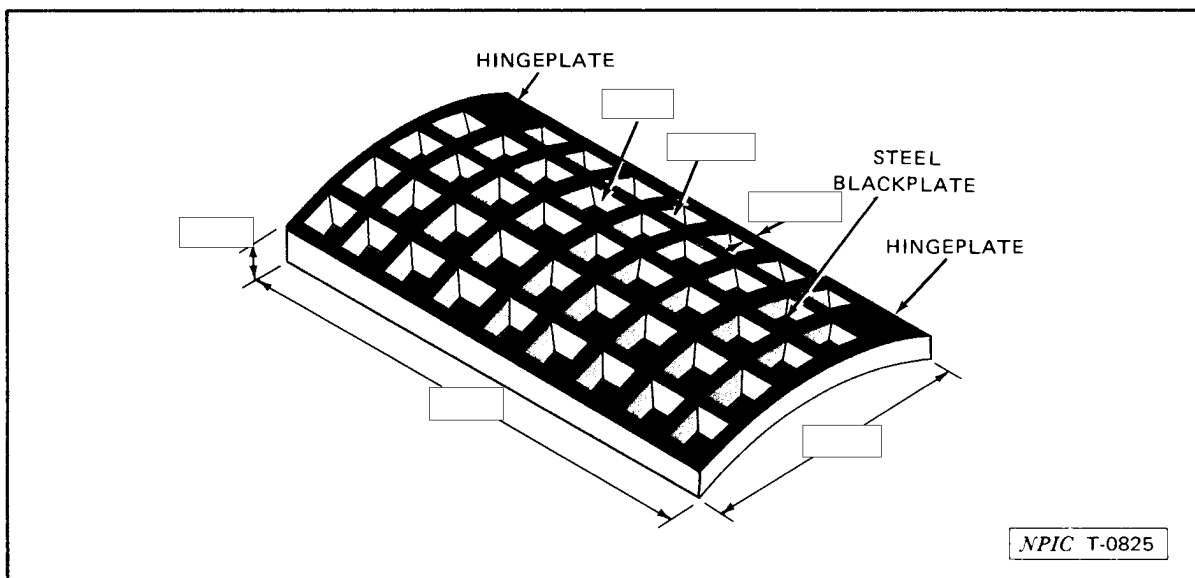
5. (TSR) In August 1979, a buildup of activity was again observed in the housing support area, indicating a renewal of blast door construction. On [] a scaffold was erected against the front of the two frameworks and filling the voids in the framework with concrete was started. Work to fill the voids in the door continued on [] (Figure 7) and []. When the site was next observed on [] the blast doors were complete and the scaffold had been removed (Figure 8).

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FIGURE 3. DIMENSIONS AND ARTIST'S SKETCH OF BLAST DOOR FRAMEWORK

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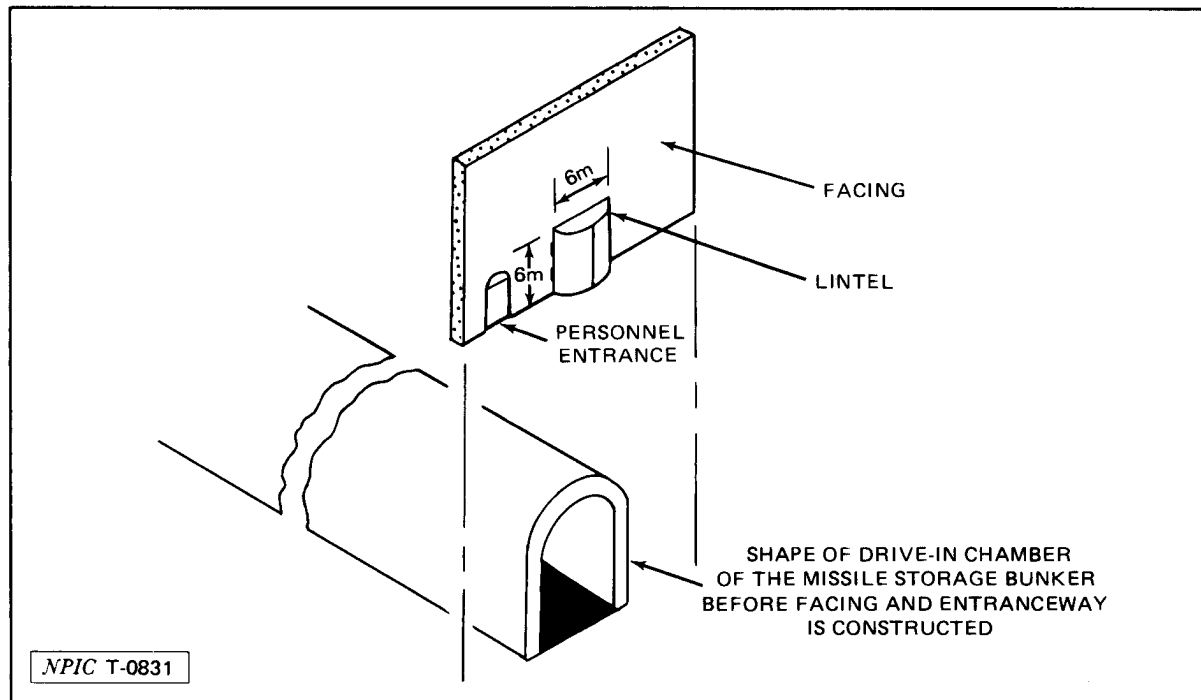


FIGURE 9. ARTIST'S SKETCH OF TYPICAL COMPLETED BLAST DOORS AT MISSILE STORAGE CAVE/BUNKER

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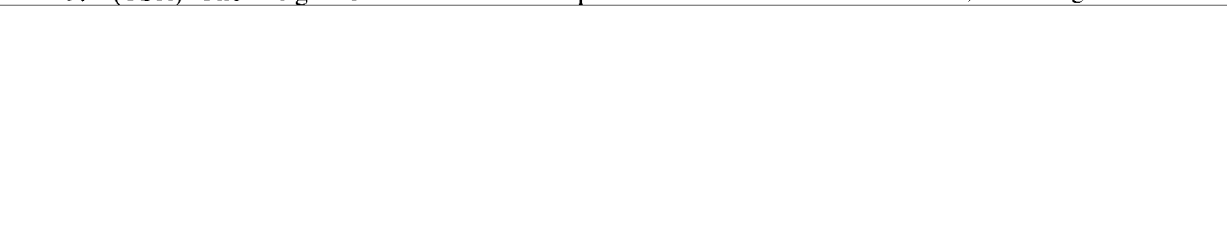
6. (TSR) Imagery of the completed, installed clamshell blast doors indicates that the overall dimensions of the closed door pair are 6 meters wide and 6 meters high, including the lintel (Figures 8 and 9). The doors are placed within the concrete retaining wall and adit facing of the storage bunker. The lintel, also of concrete, closes the space between the flat facing and curved doors. No door guides were observed; each clamshell door appears to be entirely supported by two large hinges. Most of the completed bunkers also contain one or two personnel entrances. Each personnel entrance is small (about 2 by 1 meters) and is protected by a rectangular, flat door of unknown composition.

7. (TSR) During June and July 1980, the blast doors on the missile storage cave or bunker at Delingha SSM Launch Sites 2, 3, and 4 (BE Numbers [redacted] respectively) were constructed. The activity observed at these sites in 1980 supported the construction sequence and data concerning door size, shape, and composition observed at Delingha SSM Launch Site 1 in 1978 and 1979. Stereoscopic imagery of good interpretability was acquired of the blast door framework at Delingha Launch Site 2 on [redacted] (Figure 10). Each space in the door where work was underway had a slanted bin in front of it. The process to fill the blast doors with concrete appears to be a manual operation with the final, exterior door surface applied with a trowel in a manner similar to stucco.

8. (TSR) A special study of the completed blast doors was requested by NPIC in order to determine the composition of the exterior surface. The study technique used the behavior of fall-off reflectance of sunlight across a surface when the shape of the surface, the sun angle, camera position angle, and image exposure values are known. Two separate images of the completed blast doors at Delingha SSM Launch Site 1 on [redacted] were used. The behavior of the reflected light matched values predicted for concrete. The values were very different from those which would be expected from a steel-surface, the other principal possibility. Copies of the study may be obtained, on request, from NPIC.¹

IMAGERY ANALYST'S COMMENTS

9. (TSR) The weight of each half of a pair of blast doors is about 24,000 kilograms. The



Many specialized types of concrete have been developed. The blast doors may require both a quick-drying concrete and a concrete mixed with steel pellets to help attenuate electromagnetic pulse effects from a nuclear detonation. Concrete mixed with steel pellets can have a specific density twice that of ordinary concrete.

10. (TSR) Detailed analysis indicates that the clamshell blast doors at CSS-3 rollout launch sites are constructed of steel framework filled with concrete. A similar construction process is being used for the silo door at launch sites for the CSS-X-4 ICBM. Most other strategic SSM bases and complexes in China were constructed in the late 1960s and early 1970s. The caves and tunnels at these areas also have clamshell blast doors, but very little high-resolution imagery was obtained

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during door construction. When the clamshell doors at these complexes are imaged without camouflage covers or materials over them, the doors appear lighttoned, indicating an outside surface of concrete—the same material used on the facing and walls surrounding the cave entrance.

11. (TSR) Clamshell-shaped blast doors have also been observed in China [redacted] and at underground storage facilities at several airfields.⁴ The doors at the [redacted] site appear similar to those at SSM facilities. The blast doors at airfields are of several types and sizes, not all clamshell shaped, and many appear to be entirely composed of steel without concrete.

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12. (TSR) On [redacted] at least one set of clamshell-shaped blast doors was subjected to the effects of a nuclear detonation. The test, designated CHIC 12, was conducted at the Lop Nur [redacted] at surface level and had a recorded yield of [redacted] Clamshell doors, 11 meters wide by 16 meters high, were positioned 433 meters from ground zero and oriented directly toward the blast.⁶ No posttest damage was apparent.⁷

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(TSR) All applicable KEYHOLE imagery acquired through [] was used in the preparation of this report.

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(S) Comments and queries regarding this report are welcome. They may be directed to [] Asian Forces Division, []

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